

GAO

Report to the Chairman and Ranking
Minority Member, Subcommittee on
Military Research and Development,
Committee on Armed Services, House of
Representatives

July 1999

DEFENSE ACQUISITIONS

Evaluation of Navy's Anti-Submarine Warfare Assessment



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United States General Accounting Office
Washington, D.C. 20548

**National Security and
International Affairs Division**

B-280335

July 12, 1999

The Honorable Curt Weldon
Chairman
The Honorable Owen B. Pickett
Ranking Minority Member
Subcommittee on Military
Research and Development
Committee on Armed Services
House of Representatives

This letter responds to your request that we review (1) the Department of Defense's (DOD) 1997 antisubmarine warfare (ASW) assessment and (2) the role and funding influence of the Navy's recently established Antisubmarine Warfare Requirements Division. The conferees on the Fiscal Year 1997 National Defense Authorization Act directed the ASW assessment and supported the establishment of the ASW Requirements Division in response to concerns that ASW funding was declining relative to other Navy programs, the Navy lacked a clear plan for identifying ASW requirements and funding priorities, and ASW requirements were not being adequately considered in establishing overall Navy funding priorities. The conferees directed an assessment be made of ASW shortfalls and capabilities supported by a rigorous analysis and the establishment of priorities among ASW programs. To meet this congressional directive, the Navy said it would perform a quantitative analysis of ASW shortfalls and capabilities.

As agreed with your representative, we reviewed the assessment to determine the extent it was responsive to these requirements and provided a sound basis for making resource allocation decisions. In reviewing the ASW Requirements Division, we identified activities it had taken to influence ASW funding decisions and the outcomes of those decisions.

Results in Brief

The ASW assessment concluded that proficiency had declined and that the programs and funding levels in the fiscal year 1999 budget, as proposed at the time of the assessment, provided for adequate equipment to respond to the most likely threats. However, in providing its conclusions, the assessment notes concerns regarding the data available for its analysis. The assessment noted that tools for quantitatively assessing ASW

performance--particularly modeling and simulation tools--and available ASW studies and fleet exercise data are deficient. Much of the assessment's modeling data was based on open-ocean ASW rather than the more complex littoral environment where the Navy now believes the most likely threat exists. In our view, the assessment was not fully responsive to the conferees' direction because (1) it was not supported by a rigorous analysis of ASW shortfalls and capabilities, (2) information to support the assessment's findings was not always complete, and (3) priorities among ASW programs were not established. The Navy has subsequently provided Congress with an ASW Roadmap that places ASW programs in one of three priority categories but does not identify program priorities within each category. The absence of complete and reliable data--particularly on ASW operations in the littoral--and the absence of program priorities limit the assessment's value in making resource allocation decisions.

The ASW Requirements Division, which prepared the 1997 assessment, has sought to influence Navy ASW funding decisions in the fiscal year 1999 and 2000 budget submissions through briefings and meetings with resource sponsors and senior Navy officials, including the Chief of Naval Operations. The Division believes it has had some success in influencing decisions to fund early ASW-related research and development projects within the Office of Naval Research and to restore funding for a number of ASW programs whose funding had been reduced, deferred, or eliminated by platform divisions under the Deputy Chief of Naval Operations for Resources, Warfare Requirements, and Assessment.

Background

The primary goal of ASW is to deny the enemy the effective use of submarines. To accomplish this goal, the Navy uses ASW systems on surface ships, submarines, maritime patrol aircraft, and helicopters and fixed systems to detect, track, classify, localize, and destroy threat submarines. Such systems include acoustic and nonacoustic sensors and torpedoes.

Most current ASW systems were designed during the Cold War to pursue nuclear submarines operating in the open-ocean environment. During this period, ASW was one of the Navy's highest priority missions because of the global threat posed to the United States by submarines of the former Soviet Union. Since the end of the Cold War, DOD has shifted its focus to regional threats and conflicts. As part of this shift, the Navy is emphasizing pursuing smaller diesel-electric submarines operating in the more acoustically complex littoral environment.

During the Cold War era, naval forces were trained, organized, and equipped to counter the Soviet influence throughout the world. With the end of the Cold War and the subsequent decline in defense budgets, the Navy recognized the need to reshape its forces for regional contingencies. Consequently, the Navy began focusing its resources on joint operations in the world's littoral areas. As a result, ASW when compared to joint mission areas, such as strike warfare, antiair warfare, missile defense, and amphibious warfare, often received a lower funding priority. For example, the Navy's fiscal year 1999 budget projected a decline from about \$884 million for ASW research, development, test, and evaluation (RDT&E), or about 10.9 percent of the Navy's RDT&E budget for fiscal year 1999, to about \$566 million or about 6.8 percent for fiscal year 2003.

The 1997 assessment, which was submitted in March 1998, was required because the previous 1996 assessment did not meet congressional needs. The 1996 assessment was to provide the defense committees a long-range plan for improving ASW capabilities against potential threats in both littoral and open ocean areas. That assessment, however, did not include a rigorous analysis of ASW capabilities or establish program priorities.

The newly established ASW Requirements Directorate prepared the 1997 assessment. The Directorate was established in September 1996 under the Deputy Chief of Naval Operations for Resources, Warfare Requirements, and Assessment, to determine and assess Navy requirements in the ASW mission area. The Deputy Chief serves as the Chief of Naval Operations' (CNO) principal advisor in determining warfare requirements and allocating resources among surface, submarine, and air warfare divisions; the Expeditionary Warfare Division; and the Special Programs Division. In September 1998, after a period of evaluation, the Directorate was formally elevated to a permanently staffed division headed by a Navy captain assigned to a flag rank billet. The ASW Requirements Division monitors platform division program proposals and identifies and provides support for ASW programs. The Division has no direct control over RDT&E or procurement funds but communicates ASW requirements and capabilities to the platform divisions and the Deputy CNO.

Data Deficiencies Limit Responsiveness to Congressional Directions

In its ASW assessment, the Navy concluded that proficiency had declined and that the programs and funding levels in the fiscal year 1999 budget, as proposed at the time of the assessment, provided for adequate equipment to respond to the most likely threats. However, in providing its conclusions, the Navy noted concerns regarding the data available for its analysis. Much of the assessment's modeling data was based on open-ocean ASW rather than the more complex littoral environment where the Navy now believes the most likely threat exists. In our view, the assessment was not fully responsive to the conferees' direction because (1) it was not supported by a rigorous analysis of ASW shortfalls and capabilities, (2) information to support the assessment's findings was not always complete, and (3) priorities among ASW programs were not established. The absence of complete and reliable data--particularly on ASW operations in the littoral--and the absence of program priorities limit the assessment's value in making resource allocation decisions

The 1997 ASW Assessment

In its 1997 assessment, the Navy concluded that ASW proficiency had declined and that effective organization, comprehensive training, and modern equipment were needed to optimize proficiency. The assessment noted that organizational improvements were needed to provide an integrated approach to ASW and pointed to the establishment of the ASW Requirements Division as a step in the right direction. The assessment also noted that the opportunity to practice ASW had declined because many units are now required to perform multiple missions. For example, it cited the change in mission of the S-3 aircraft. Designed as the primary ASW aircraft flown from aircraft carriers, the S-3 has now become the air refueling platform for the carrier air wing and is not being used for the ASW mission. The assessment further noted the potential to gain greater performance from ASW systems. The assessment concluded that the program of record--programs and funding levels--in the proposed fiscal year 1999 budget provides for adequate equipment to respond to likely threats to the end of the Future Years Defense Plan.

The 1997 assessment, which was prepared by the ASW Requirements Division, was based on data collected from many diverse sources, including fleet observations, at-sea exercises, studies, and simulations. However, the Requirements Division noted concerns regarding the data available for its analysis. The Division noted that it initially expected to provide a straightforward quantitative analysis and that the evidence would be consistent and the metrics contained in the evidence would be

unambiguous. Division officials said that tools for quantitatively assessing ASW performance--particularly modeling and simulation tools--and available ASW studies and fleet exercise data are deficient. They stated that studies to support ASW investment decisions are often too narrowly focused and the whole system of identifying ASW shortfalls and correcting them is fragmented.

Assessment Not Fully Responsive to Congressional Direction

The conferees on the Fiscal Year 1997 National Defense Authorization Act, in directing the Navy to assess ASW capabilities and shortfalls, stated that the assessment be supported by a rigorous analysis of ASW shortfalls and capabilities and establish priorities among ASW programs.

Assessment Lacks Complete and Reliable Quantitative Analyses of ASW Capabilities and Shortfalls

The Navy could not rely on the use of modeling and simulation to quantitatively analyze ASW capabilities and shortfalls because most of the models are based on open-ocean conditions rather than shallow water littoral conditions that the Navy believes are the most likely future submarine threat environment. Moreover, the models have not been updated to adequately depict acoustic and environmental conditions found in the littorals or the way the fleet operates during ASW at-sea exercises. For example, the Navy said the models

- do not use multiple types of ocean bottoms, such as hilly or rocky bottoms;
- do not reflect complex sound velocity profiles typically found in the littoral environment;
- assume incorrectly that the loss of signal strength over distance is the same in both littoral and open-ocean environments;
- do not adequately account for littoral environmental conditions such as changes in temperature and levels of salinity; and
- make performance predictions based only on one-on-one platform engagements, rather than combined ASW force operations.

The lack of quantitative modeling analyses of ASW capabilities and shortfalls in shallow water littoral conditions raises concerns regarding the basis and support for the assessment's conclusions and its usefulness for making resource allocation decisions. A Navy modeling official stated that about \$1.5 million would be required annually to upgrade and maintain the full spectrum of ASW simulations and models. The official noted that the Undersea Warfare Center received \$200,000 to analyze how the littoral environment adversely affected ASW system performance during one

specific at-sea training exercise and that this data will be used to improve its models.

Information to Support Findings Was Not Always Complete

The assessment contained significant ASW data and analyses, but in several areas the information was not complete. Examples included (1) information from ASW at-sea exercises; (2) plans for addressing threats from the most advanced submarines; (3) information on key ASW command, control, communication, and intelligence requirements, capabilities and shortfalls; and (4) the impacts of using multiple platforms to conduct ASW. In addition, the assessment's conclusions assumed higher funding levels for ASW programs than were ultimately budgeted.

At-sea Exercises

To assess the performance of ASW systems, the Navy analyzed the results of at-sea exercises conducted under the Ship Antisubmarine Warfare Readiness/Effectiveness Measuring program in both open ocean and littoral environments. The assessment concluded that ASW proficiency had declined. However, the exercise data did not provide information on the causes for the reduced performance, and the assessment did not address the impact of environmental conditions on ASW performance. In addition, exercise data on torpedo performance was based on a limited number of firings. Officials of the Surface Warfare Development Group told us that the small number of torpedo firings in shallow water littoral environments made it practically impossible to draw conclusions on torpedo performance.

Advanced Submarine Threat

ASW modeling results against a technologically advanced nuclear submarine in the open ocean identified a number of shortfalls. The assessment discussed the capabilities and shortfalls of ASW systems against the more advanced threat but provided little information on plans to address these shortfalls. According to Navy officials, the assessment did not address the shortfalls because it assumed the most likely threat would be a diesel submarine operating in the littoral environment. The assessment concluded that the program of record in the proposed President's fiscal year 1999 budget was adequate to meet the likely submarine threat to the end of 2003.

Command, Control, Communications, and Intelligence Issues

The assessment did not evaluate ASW command, control, communication, and intelligence (C3I) capabilities and shortfalls. Because a small, slow-moving, and quiet diesel submarine operating in the littoral is difficult for ASW platforms to detect, there is a greater need for ASW platforms to share submarine threat data. The assessment recognized C3I systems as

important components of ASW but did not include information on current requirements, capabilities, or shortfalls.

Using Combined Platforms

The assessment did not address the use of combinations of ASW assets to detect, track, and destroy enemy submarines. Attrition rates in the Navy campaign warfare models considered only one-on-one ASW engagements to predict the number of enemy submarines detected and destroyed over time. The predictions do not reflect the increased effectiveness of combined air, surface, and subsurface assets that the Navy plans to use in littoral ASW operations.

Funding Changes

The assessment's conclusion that there would be adequate ASW capabilities to respond to the most likely threats was based on program and funding levels projected at the time of the assessment in the fiscal year 1999 budget. However, ASW funding projected in the fiscal year 2000 budget submission was lower than the fiscal year 1999 budget projections. For example, the Navy reduced funding for the Lightweight Hybrid MK-54 Torpedo program, which will delay the torpedo's introduction into the fleet by 2 years. Also, the MK-50 Lightweight Torpedo Phase II shallow water upgrade was canceled because of funding constraints.

Assessment Identifies ASW Needs but Not Priorities

The assessment concluded that the ASW program of record as contained in the proposed President's fiscal year 1999 budget was adequate to meet the likely future threat and identified the following near-, mid-, and long-term ASW mission requirements.

- Near-term requirements
 - Improve ASW crew proficiency by increasing training.
 - Buy additional towed array sensors for submarines.
 - Develop an ASW system for the new DD-21 destroyer.
 - Accelerate MK-48 torpedo upgrades.
- Mid-term requirements
 - Further improve the proficiency of the entire ASW team.
 - Develop operational concepts for network centric operations.
- Long-term requirements
 - Develop long endurance sensors and unmanned ASW vehicles.
 - Design sensors that automatically adjust to a complex acoustic environment.

The assessment did not establish ASW program priorities. However, the Navy subsequently developed an integrated ASW Roadmap that defines and

prioritizes a set of broad ASW requirements. This document (1) places each ASW-related requirement into its primary functional area (i.e., surveillance, detection, and localization) and (2) prioritizes each requirement into three priority categories—essential, critical, and important. This document was completed in late February 1999 and provided to Congress. Although the Roadmap does provide priorities by category, it does not prioritize programs within the three priority categories. Thus, the Roadmap would be of little value in making funding decisions among all the programs identified as essential.

Requirements Division Seeks to Influence ASW Funding Priorities and Decisions

In addition to preparing the 1997 assessment, ASW Requirements Division officials told us they have sought to restore funding for a number of ASW programs whose proposed funding had been reduced or eliminated. For the most part, the ASW Requirements Division sought to influence funding decisions by the primary resource sponsors—the Surface, Submarine, and Air Warfare Divisions. They also sought to influence the funding of early ASW-related research and development projects within the Office of Naval Research (ONR).

Efforts to Influence Fiscal Year 1999 Funding

According to Division officials, they reviewed the fiscal year 1999 platform division program proposals and identified ASW programs for which funds had been deferred or deleted and sought to have funding restored on those programs they considered to be most important. Since the 1997 ASW assessment had not yet been completed, the officials stated that they used their judgment in making recommendations affecting fiscal year 1999 program proposals. Examples of their efforts to influence fiscal year 1999 funding decisions are presented below. We could not determine that the Division's efforts were the sole cause for the funding decisions, but we did verify the Division's actions and the final outcome of the funding decision-making process based on documents and records of meetings and decisions.

During development of its fiscal year 1999 program plan, the Surface Warfare Division proposed delaying the initial operating capability for the Lightweight Hybrid Torpedo Development Program from fiscal year 2001 to 2005. This would have potentially made available for other uses about \$82 million of the torpedo's planned funding over the fiscal year 1999 to 2003 period. Because ASW Requirements Division officials believed that the program represented an important and needed capability for surface combatants and air platforms, they questioned the proposed reduction

during a July 1997 meeting attended by surface, submarine, and air division directors. Though no specific funding restoration decision was made at that meeting, about \$58 million was eventually restored to the program plan. According to an official from the Programming Division, the restored funds permitted the program's initial operating capability to be moved back up to fiscal year 2003.

The ASW Requirements Division also sought to influence ONR funding of ASW research projects. For example, due to funding constraints, ONR staff tentatively decided to not conduct sea trials of an automated radar periscope detection and discrimination technology they had successfully tested on land. Because this technology held promise for detecting diesel-electric submarines in littoral waters, the ASW Requirements Division Director, in an April 1, 1998, memorandum, requested the Chief of Naval Research to support continued program testing in fiscal year 1998. On May 22, 1998, the Chief of Naval Research committed to providing the necessary funding to perform the sea trials during July 1998 and demonstrating the system aboard a research maritime patrol aircraft in fiscal year 1999.

Efforts to Influence Fiscal Year 2000 Funding

The 1997 assessment indicated potential shortfalls in ASW programs related to (1) surveillance and cueing; (2) tactical sensors and systems needed to improve detection of submarines, including high search rate airborne platforms; and (3) torpedo upgrades. Using these as a baseline reference, ASW Requirements Division officials sought to influence the resource sponsors during the fiscal year 2000 budget development process as shown in the following examples. As noted earlier, we could not determine that the ASW Requirements Division's efforts were the sole cause for the funding decision, but we did verify the Division's actions and the final outcome of the decision process.

The Submarine Warfare Division, during development of its fiscal year 2000 program proposal, decided to terminate the Compact Low Frequency Active development program, resulting in the availability of \$10.5 million in fiscal year 2000 and 2001 development funding to apply to other division program needs. Because this program would enhance a very limited ASW surveillance capability in littoral waters, the ASW Requirements Division Director, during an April 30, 1998, meeting with the Deputy CNO for Resources, Warfare Requirements, and Assessments, and later with the CNO, recommended that the entire \$10.5 million be restored to the program. In late May 1998, the Submarine Warfare Division reinstated this

development program and restored a total of \$22 million of development funding through fiscal year 2004.

The Submarine Warfare Division proposed to delay the Advanced Deployable System development program, resulting in the availability of nearly \$93 million in out-year development funding to apply to other division program needs. This program would develop cueing to enhance the ability of Navy submarines and other ASW platforms to conduct ASW in littoral waters against diesel-electric submarines. Because of this potential enhancement, the ASW Requirements Division Director, during an April 30, 1998, meeting with the Deputy CNO for Resources, Warfare Requirements, and Assessments, and later with the CNO, recommended that the entire \$93 million reduction be restored. Based on the ASW Requirements Division Director's recommendation, \$92.3 million was initially restored. Subsequent adjustments by the Navy Comptroller and DOD resulted in an additional \$50.2 million being added to the program.

Although it is not possible to directly or fully attribute the Division's actions to specific budget decisions, ASW Requirements Division officials noted that the fiscal year 2000 budget requested about \$759 million for ASW-related RDT&E funding, or about 9.5 percent of the Navy's RDT&E budget for fiscal year 2000, and projected about \$643 million, or about 7.8 percent of the Navy's RDT&E budget for fiscal year 2003. This \$643 million amount is about \$77 million more than the amount projected for 2003 in the fiscal year 1999 budget.

Conclusions

The Navy's 1997 assessment noted a number of deficiencies in the data that was available for its analysis. The assessment was not fully responsive to congressional direction because of data limitations and concerns associated with the Navy's shift in ASW emphasis from open ocean to littoral operations. Until more data and analyses of ASW operations and capabilities in the littoral become available, uncertainties will surround the effectiveness of ASW plans, programs, and capabilities. The ASW Requirements Division has been active in its efforts to influence ASW funding decisions.

Agency Comments and Our Evaluation

In written comments, DOD concurred with a draft of this report (see app. I). DOD said the Navy has reaffirmed that ASW is a priority mission as well as a core and enduring competency. The CNO has

requested a systematic plan to tackle the issues identified in the 1997 ASW assessment and integrated roadmap and the ASW Requirements Division is leading the development of this plan. DOD also provided technical clarifications that we incorporated as appropriate.

Scope and Methodology

To determine the extent that the 1997 ASW assessment included a quantitative analysis of ASW capabilities and shortfalls, we reviewed the data and sources of information used to support the assessment's findings and conclusions. This included discussions with officials of the ASW Requirements Division; Office of Naval Research; Office of Naval Intelligence; Naval Sea Systems Command, including the Surface Ship Directorate and Submarine Directorate; Naval Air Systems Command (ASW Division); and the Naval Undersea Warfare Center, Newport Division. We also interviewed officials of the Center for Naval Analyses; the Naval Surface Warfare Center; Presearch, Inc., a contractor that helped prepare the 1997 ASW assessment; and the former Director of Antisubmarine Warfare programs, who was responsible for preparing the 1996 ASW assessment. We also reviewed modeling documentation prepared by the Naval Undersea Warfare Center, Newport Division. We also discussed with Center officials the benefits and shortfalls of the Center's models the Navy planned to use to perform the quantitative analysis. We discussed the deep water modeling used in the assessment with officials of Johns Hopkins University. We also discussed modeling and simulation with the Director and Technical Director of the ASW Requirements Division.

To determine if the Navy performed a sufficient detailed analysis to support the assessment's findings and conclusions, we performed a detailed review and analysis of the assessment. We reviewed and analyzed the assessment to determine if it established or contained priorities among ASW programs. We also reviewed torpedo plans and performance particularly in shallow, littoral water. We obtained the views of an ASW Requirements Division torpedo official on the effectiveness and capabilities of lightweight and heavyweight torpedoes. We reviewed and analyzed the Commander, Surface Warfare Development Group's March 1997 "Cross-Sharem Analysis of Antisubmarine Warfare Effectiveness in Shallow Water/Littoral Undersea Warfare Exercises." We interviewed torpedo officials from the Undersea Weapons Program Office and the Naval Undersea Warfare Center, Newport Division. We discussed torpedo data contained in the assessment with an official of the Surface Warfare Development Group. We obtained and reviewed heavyweight and lightweight torpedo firing data in shallow/littoral water since the assessment was completed. We also

obtained data on torpedo upgrades and the schedule status of the new MK-54 Lightweight development program.

To identify the impact and influence that the Division has had on Navy ASW funding decisions, we asked ASW Requirements Division staff to provide examples of where their influence affected funding decisions during development of the Navy's fiscal year 1999 and 2000 budget requests. For each example identified, we determined the basis for the initiated action and collected supporting budget briefings and other documentation from both the Division and the respective Navy organization responsible for budgeting action. We also reviewed Navy database documentation that supported the funding restorations.

To identify trends in ASW funding, we first determined the ASW-related RDT&E programs included in the Navy's 1997 ASW assessment report. We then determined the Navy's funding projections applicable to these programs over the fiscal year 1999 to 2003 period as contained in the fiscal year 1999 and 2000 President's budgets. In addition, we compared the ASW-related RDT&E funding projections to the Navy's funding projections of total RDT&E budget authority to arrive at the ASW-related percentage. We limited our analyses to RDT&E funding because of the difficulties associated with classifying the extent to which other appropriations are ASW-related. Finally, we asked ASW Requirements Division officials to comment on funding projections of ASW-related RDT&E programs contained in the fiscal year 1999 and 2000 President's budgets.

We performed our review between August 1998 and April 1999 in accordance with generally accepted government auditing standards.

We are also sending copies of this report to Senator John Warner, Chairman, and Senator Carl Levin, Ranking Minority Member, Senate Committee on Armed Services; Senator Ted Stevens, Chairman, and Senator Robert C. Byrd, Ranking Minority Member, Senate Committee on Appropriations; and Representative C.W. Bill Young, Chairman, and Representative David R. Obey, Ranking Minority Member, House Committee on Appropriations. We are also sending copies of this report to the Honorable William Cohen, Secretary of Defense; the Honorable Richard Danzig, Secretary of the Navy; the Honorable William J. Lynn, Under Secretary of Defense (Comptroller); and the Honorable Jacob Lew, Director, Office of Management and Budget. Copies will also be made available to others upon request.

Please contact me on (202) 512-4841 or Richard Price on (202) 512-3630 if you or your staff have any questions concerning this report. Key contributors to this assignment were John Heere, Richard Silveira, and Ralph Tavares.

Sincerely yours,

A handwritten signature in black ink that reads "James F. Wiggins". The signature is fluid and cursive, with "James" on the top line, "F." in a small circle, and "Wiggins" on the bottom line.

James F. Wiggins
Associate Director
Defense Acquisitions Issues

Comment from the Secretary of Defense



OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON
WASHINGTON DC 20301-3000

ACQUISITION AND
TECHNOLOGY

June 16, 1999

Mr. James R. Wiggins
Associate Director, Defense Acquisition Issues
National Security Analysis and International
Affairs Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Wiggins:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "DEFENSE ACQUISITIONS: Evaluation of Navy's Anti-Submarine Warfare Assessment," dated May 17, 1999 (GAO code 707360), OSD Case 1822.

The DoD concurs with the draft report. The Navy has reaffirmed that ASW is a priority mission, as well as a core and enduring competency. The Chief of Naval Operations issued an ASW focus statement and an all-Navy message requesting a systematic plan to tackle the issues identified in the 1997 ASW Assessment and Integrated Roadmap. These include improving classroom and at-sea training; enhancing detection and hitting of submarines; improving ASW models, simulation, and wargaming; developing state-of-the-practice networking protocols and displays; and overcoming organizational stovepipes. The ASW Requirements Division is leading the development of this plan.

Suggested technical changes for clarification and accuracy have been provided separately. The Department appreciates the opportunity to comment on the draft report.

Sincerely,

George R. Schneiter
For George R. Schneiter
Director
Strategic & Tactical Systems



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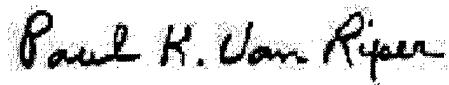
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Department of the Navy
Marine Corps Combat Development Command
Quantico, VA

25 July 1997

A Concept for Future Military Operations on Urbanized Terrain

The tide of expanding urbanization in the developing world has increased the likelihood that Marines will again be called upon to operate in urban areas. Such evolutions will pose many challenges. ***A Concept for Future Military Operations on Urbanized Terrain*** addresses these challenges by exploring the application of the tenets of *maneuver warfare* to an environment which has traditionally been characterized by *attrition-style combat*. By combining this new intellectual approach with emerging technology, Marines will exploit the unique characteristics of urban settings. ***A Concept for Future Military Operations on Urbanized Terrain*** will guide the process of research and experimentation by which we will discern required operational capabilities and potential solutions.



PAUL K. VAN RIPER
Lieutenant General, U.S. Marine Corps
Commanding General
Marine Corps Combat Development Command

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